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MILLEN, WHITE, ZELANO & BRANIGAN, P.C.
2200 CLARENDON BLVD.
SUITE 1400
ARLINGTON, VA 22201

EXAMINER	
LEUNG, JENNIFER A	

ART UNIT	PAPER NUMBER
1764	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/434,282	CHAPUS ET AL.	
	Examiner	Art Unit	
	Jennifer A. Leung	1764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 February 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *12,15,16,19-24,27,28 and 30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *12,15,16,19-24,27,28 and 30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicants' After Final Amendment submitted on February 13, 2004 has been received and considered. Claims 1-11, 13, 14, 17, 18, 25, 26 and 29 are cancelled. Claims 12, 15, 16, 19-24, 27, 28 and 30 remain active.

Withdrawal of Allowable Subject Matter

2. The indicated allowability of claims 15, 16 and 27 is withdrawn in view of the newly discovered reference to Watkins (US 3,161,586). Therefore, the finality of the prior Office Action is withdrawn. Rejections based on the newly cited reference follows.

Claim Objections

3. Claims 15, 16, 22 and 27 are objected to because of the following informalities:

In claim 15,

- The phrase, "according to claim 25" (line 1), should be deleted, since claim 25 has been cancelled and incorporated therein.
- The phrase, "said apparatus also comprising at least one of the following:" (lines 13-14) should be deleted, since the apparatus only comprises sweetening zone (12).
- The passage beginning with, "a treatment zone (7)…" (line 19) and ending with, "… said treatment zone (7);" (line 25) should be deleted, since the apparatus only comprises sweetening zone (12).
- The term, "or" (line 18) should be changed to -- and --.

In claim 16,

- The phrase, "and said apparatus also comprising at least one of the following:" (lines 13-14) should be deleted, since the apparatus only comprises sweetening zone (12).
- The passage beginning with, "a treatment zone (7)…" (line 19) and ending with, "… said

apparatus further comprises" (lines 26) should be deleted, since the apparatus only comprises sweetening zone (12).

– The term, "or" (line 18) should be changed to -- and --.

In claim 22,

– The term, "selected" (line 2) should be changed to -- selective --.

In claim 24,

– The term -- and -- should be inserted before the phrase, "of said second catalyst zone." (lines 2-3).

In claim 27,

– The phrase, "and said apparatus also comprising at least one of the following:" (lines 13-14) should be deleted, since the apparatus comprises both sweetening zone (12) and treatment zone (7).

– The term "or" (line 18) should be changed to -- and --.

– The phrase, "wherein said apparatus comprises both said sweetening zone (12) and said treatment zone (7)." (lines 24-25) should be deleted.

– The semicolon ";" (line 23) should be changed to a period -- . --.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the

claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 12, 15, 16, 19-21, 27, 28 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watkins (US 3,161,586) in view of Peyton (Ondeo/Nalco Fuel Field Manual).

A. Independent claim 15 and corresponding dependent claim 28

Regarding claim 15, Watkins (see Figure) discloses an apparatus comprising:

a fractionation column (fractionator **2**; column 6, lines 23-28) having a gas inlet line (charge stock line **1**), a first discharge line at an upper portion of the column (light fraction line **8**), and a second discharge line at a lower portion of the column (heavy fraction line **3**);

a hydrotreatment zone comprising a catalytic bed (reaction zone **20**; column 7, lines 25-32; column 9, lines 3-6), a gasoline cut inlet line **19** in fluid communication with the first discharge line **8**, and a hydrotreated effluent outlet line **21**;

a stripping zone (separator **24** or stripper **29**; column 7, line 33 to column 8, line 45) comprising a hydrotreated gas inlet (line **23** or **28**, respectively) in fluid communication with the hydrotreated effluent outlet line **21**, an H_2S outlet line (line **25/26** or **30**, respectively) and a stripped gasoline outlet line (line **16** or **31**, respectively); and

a selective diene hydrogenation zone (reaction zone **11**; column 6, lines 54-73) located between the fractionation column **2** and the hydrotreatment zone **20**, said selective diene hydrogenation zone **11** comprising a gasoline inlet line **10** in fluid communication with the first discharge line **8**, and a dedienized first gasoline cut outlet line **12** in fluid

communication with said gasoline cut inlet line **19**.

Although Watkins does not explicitly recite a "sweetening zone" comprising a gas inlet in fluid communication with the stripped gas outlet line **16** or **31** and an oxidizing agent supply line, and connected to a stripped and sweetened gasoline outlet line, Watkins further discloses,

> "... separator **24** may be combined with *additional separating and/or adsorbing means*, whereby a somewhat different flow pattern and apparatus arrangement results. For example, water-injection may be provided in line **23** for the purpose of *adsorbing the ammonia* therein, the water and adsorbed ammonia being removed by suitable liquid level control means from separator **24**. Similarly, the gaseous phase from separator **24** and line **25** may be so *treated as to effect substantially complete removal of hydrogen sulfide and/or light paraffinic hydrocarbons*. As hereinabove set forth, *such modifications are readily recognized by those possessing skill within the art*, and are not intended to limit unduly the process of the present invention." (column 8, lines 27-45; with emphasis added).

Therefore, it would have been within the scope of the invention of Watkins to provide additional processing equipment for the further refinement of the stripped gasoline exiting lines **16** and/or **31**, and it would have been obvious for one of ordinary skill in the art at the time the invention was made to select a sweetening zone for the additional processing equipment in the apparatus of Watkins, on the basis of suitability for the intended use, because the use of sweetening processes for improving the quality of refined fuel streams is conventionally known to those skilled the art, as evidenced by Peyton. For example, Peyton teaches the conventionality of sweetening a refined fuel stream according to the "Fixed-Bed Copper Chloride Sweetening Process" or the "Merox Process", wherein both processes involve the sparging of an oxidizing agent such as air or oxygen into the fuel stream, in the presence of a catalyst zone (page 27, section 2).

Regarding claim 28, Watkins disclose the entire contents of the first discharge line **8** pass to the hydrotreatment zone **20**, subsequent to passage through hydrogenation reactor **11** (see

Figure). Although Watkins is silent as to line **8** being directly connected to hydrotreatment zone **20**, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the apparatus of Watkins as such, on the basis of suitability for the intended use, because rearrangement of pipe connections for the purpose of providing a direct or indirect connection involves routine skill in the art, and it is well known to provide a direct connection between two processing zones having other processing zones therebetween, in order to create a "bypass" between the two processing zones.

B. Independent claim 16 and corresponding dependent claims 20, 21 and 30

Regarding claim 16, Watkins (see Figure) discloses an apparatus comprising:

a fractionation column (fractionator **2**; column 6, lines 23-28) having a gas inlet line (charge stock line **1**), a first discharge line at an upper portion of the column (light fraction line **8**), and a second discharge line at a lower portion of the column (heavy fraction line **3**);

a hydrotreatment zone comprising a catalytic bed (reaction zone **20**; column 7, lines 25-32; column 9, lines 3-6), a gasoline cut inlet line **19** in fluid communication with the first discharge line **8**, and a hydrotreated effluent outlet line **21**;

a stripping zone (separator **24** or stripper **29**; column 7, line 33 to column 8, line 45) comprising a hydrotreated gas inlet (line **23** or **28**, respectively) in fluid communication with the hydrotreated effluent outlet line **21**, an H_2S outlet line (line **25/26** or **30**, respectively) and a stripped gasoline outlet line (line **16** or **31**, respectively)

a selective diene hydrogenation zone (reaction zone **11**; column 6, lines 54-73) located between the fractionation column **2** and the hydrotreatment zone **20**, said selective diene hydrogenation zone **11** comprising a gasoline inlet line **10** in fluid communication with

the first discharge line **8**, and a dedienized first gasoline cut outlet line **12** in fluid communication with said gasoline cut inlet line **19**; and

a hydrotreating zone (reaction zone **20**; column 7, lines 25-32) having a gasoline cut inlet line **19** in fluid communication with the second discharge line **3**, a first hydrotreated cut outlet line **21**, and a hydrogen supply line (hydrogen-rich gas stream line **18** or additional hydrogen line **14**; column 6, lines 29-36; column 6, line 74 to column 7, line 16) connected to the second discharge line **3** or the hydrotreating zone **20**, and a stripping column (separator **24** or stripper **29**; column 7, line 33 to column 8, line 45) having a hydrotreated cut inlet line (line **23** or **28**, respectively) in fluid communication with the first hydrotreated cut outlet line **21**, an H_2S outlet line (line **25/26** or **30**, respectively), and a second hydrotreated cut outlet line (line **16** or **31**, respectively).

Although Watkins does not explicitly recite a "sweetening zone" comprising a gas inlet in fluid communication with the stripped gas outlet line **16** or **31** and an oxidizing agent supply line, and connected to a stripped and sweetened gasoline outlet line, Watkins further discloses,

> "… separator **24** may be combined with *additional separating and/or adsorbing means*, whereby a somewhat different flow pattern and apparatus arrangement results. For example, water-injection may be provided in line **23** for the purpose of *adsorbing the ammonia* therein, the water and adsorbed ammonia being removed by suitable liquid level control means from separator **24**. Similarly, the gaseous phase from separator **24** and line **25** may be so *treated as to effect substantially complete removal of hydrogen sulfide and/or light paraffinic hydrocarbons*. As hereinabove set forth, *such modifications are readily recognized by those possessing skill within the art*, and are not intended to limit unduly the process of the present invention." (column 8, lines 27-45; with emphasis added).

Therefore, it would have been within the scope of the invention of Watkins to provide additional processing equipment for the further refinement of the stripped gasoline exiting lines **16** and/or

31, and it would have been obvious for one of ordinary skill in the art at the time the invention was made to select a sweetening zone for the additional processing equipment in the apparatus of Watkins, on the basis of suitability for the intended use, because the use of sweetening processes for improving the quality of refined fuel streams is conventionally known to those skilled the art, as evidenced by Peyton. For example, Peyton teaches the conventionality of sweetening a refined fuel stream according to the "Fixed-Bed Copper Chloride Sweetening Process" or the "Merox Process", wherein both processes involve the sparging of an oxidizing agent such as air or oxygen into the fuel stream, in the presence of a catalyst zone (page 27, section 2).

Regarding claim 20, Watkins discloses the selective diene hydrogenation zone **11** contains a catalyst comprising at least one group VIII metal and a support (column 9, lines 3-31).

Regarding claim 21, Watkins discloses the catalyst of the selective diene hydrogenation zone (reaction zone **11**) comprises 0.1-1% palladium deposited on said support (i.e., "Platinum group metals may be advantageously employed in concentrations of from about 0.1% to about 2.0% by weight," column 9, lines 11-15 and 26-35).

Regarding claim 30, Watkins discloses gasoline cut inlet line **19** is adapted to receive the entire amount of first gasoline cut **8** from the upper portion of the fractionation column **2** (i.e., the entire light cut, flowing from line **8** to line **10** to line **12** and finally to line **19**; see Figure).

C. Independent claim 27 and corresponding dependent claims 12 and 19

Regarding claim 27, Watkins disclose an apparatus comprising:

a fractionation column (fractionator **2**; column 6, lines 23-28) having a gas inlet line (charge stock line **1**), a first discharge line at an upper portion of the column (light fraction line **8**), and a second discharge line at a lower portion of the column (heavy fraction line **3**);

a hydrotreatment zone comprising a catalytic bed (reaction zone **20**; column 7, lines 25-32; column 9, lines 3-6), a gasoline cut inlet line **19** in fluid communication with the first discharge line **8**, and a hydrotreated effluent outlet line **21**;

a stripping zone (separator **24** or stripper **29**; column 7, line 33 to column 8, line 45) comprising a hydrotreated gas inlet (line **23** or **28**, respectively) in fluid communication with the hydrotreated effluent outlet line **21**, an H_2S outlet line (line **25/26** or **30**, respectively) and a stripped gasoline outlet line (line **16** or **31**, respectively); and

a treatment zone (reaction zone **11**; column 6, lines 54-73) in fluid communication with the first discharge line **8** and the hydrotreatment zone **20**, said treatment zone **11** having a gas cut inlet line **10** connected to the first discharge line **8**, a treated gasoline cut outlet line **12**, and at least one catalyst bed containing 0.1-1% palladium deposited on a support (i.e., "Platinum group metals may be advantageously employed in concentrations of from about 0.1% to about 2.0% by weight," column 9, lines 11-15 and 26-35).

Although Watkins does not explicitly recite a "sweetening zone" comprising a gas inlet in fluid communication with the stripped gas outlet line **16** or **31** and an oxidizing agent supply line, and connected to a stripped and sweetened gasoline outlet line, Watkins further discloses,

> "... separator **24** may be combined with *additional separating and/or adsorbing means*, whereby a somewhat different flow pattern and apparatus arrangement results. For example, water-injection may be provided in line **23** for the purpose of *adsorbing the ammonia* therein, the water and adsorbed ammonia being removed by suitable liquid level control means from separator **24**. Similarly, the gaseous phase from separator **24** and line **25** may be so *treated as to effect substantially complete removal of hydrogen sulfide and/or light paraffinic hydrocarbons*. As hereinabove set forth, *such modifications are readily recognized by those possessing skill within the art*, and are not intended to limit unduly the process of the present invention." (column 8, lines 27-45; with emphasis added).

Therefore, it would have been within the scope of the invention of Watkins to provide additional processing equipment for the further refinement of the stripped gasoline exiting lines **16** and/or **31**, and it would have been obvious for one of ordinary skill in the art at the time the invention was made to select a sweetening zone for the additional processing equipment in the apparatus of Watkins, on the basis of suitability for the intended use, because the use of sweetening processes for improving the quality of refined fuel streams is conventionally known to those skilled the art, as evidenced by Peyton. For example, Peyton teaches the conventionality of sweetening a refined fuel stream according to the "Fixed-Bed Copper Chloride Sweetening Process" or the "Merox Process", wherein both processes involve the sparging of an oxidizing agent such as air or oxygen into the fuel stream, in the presence of a catalyst zone (page 27, section 2).

Regarding claim 12, Watkins disclose the apparatus further comprising a hydrotreating zone (reaction zone **20**; column 7, lines 25-32) having a gasoline cut inlet line **19** in fluid communication with the second discharge line **3**, a first hydrotreated cut outlet line **21**, and a hydrogen supply line (hydrogen-rich gas stream line **18** or additional hydrogen line **14**; column 6, lines 29-36; column 6, line 74 to column 7, line 16) connected to the second discharge line **3** or the hydrotreating zone **20**, and a stripping column (separator **24** or stripper **29**; column 7, line 33 to column 8, line 45) having a hydrotreated cut inlet line (line **23** or **28**, respectively) in fluid communication with the first hydrotreated cut outlet line **21**, an H_2S outlet line (line **25/26** or **30**, respectively), and a second hydrotreated cut outlet line (line **16** or **31**, respectively).

Regarding claim 19, Watkins discloses the hydrotreatment zone **20** contains a catalyst having at least one group VIII metal, at least one group VI metal, or a combination thereof (column 9, lines 3-31).

5. Claims 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watkins (US 3,161,586) in view of Peyton (Ondeo/Nalco Fuel Field Manual), as applied to claims 16, 20 and 21 above, and further in view of Cosyns et al. (U.S. 4,208,271).

Regarding claim 22, Watkins discloses the selective diene hydrogenation zone (reaction zone **11**) catalyst may comprise a mixture of two or more elements selected from the group consisting of Group VI-A and Group VIII metals (column 9, lines 3-31). However, Watkins is silent as to the selective diene hydrogenation catalyst comprising the specifically recited compositions. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select one of the recited catalysts for the selective diene hydrogenation zone catalyst in the apparatus of Watkins, on the basis of suitability for the intended use, because such catalysts are well known in the art of selective hydrogenation, as evidenced by Cosyns, and furthermore, substitution of known equivalent structures involves only ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958). In particular, Cosyns et al. teach a catalyst composition for selective hydrogenation comprising palladium and nickel, wherein the palladium content is preferably from 0.1 to 0.5 weight % and the nickel content is preferably from 5 to 20 weight % (column 3, lines 9-12).

Regarding claim 23, Watkins is silent as to the selective diene hydrogenation zone **11** containing a first catalyst zone and a second catalyst zone, wherein the first catalyst zone is in fluid communication with the gasoline inlet line **10**, and the second catalyst zone is in fluid communication with the first catalyst zone and in fluid communication with the dedienized first gasoline cut outlet **12** (see Figure). Cosyns et al. teach a catalyst comprising a first catalyst zone

and a second catalyst zone, wherein the first catalyst zone is disposed upstream of the second catalyst zone (i.e. "gasoline and hydrogen are first passed over a catalyst comprising supported palladium metal [the first catalyst bed], and then over a catalyst comprising supported nickel metal [the second catalyst bed]; column 2, lines 1-16). Inherently, the first catalyst zone would be in fluid communication with the gasoline inlet line **10**, and said second catalyst zone would be in fluid communication with said first catalyst zone and said dedienized first gasoline cut outlet line 12 in the modified apparatus of Watkins, to enable the successive passing of gasoline and hydrogen over the first catalyst bed and subsequently the second catalyst bed. It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute the dual zone selective diene hydrogenation catalyst of Cosyns et al. for the catalyst in the modified apparatus of Watkins, because the dual zone catalyst obviates the disadvantages of prior art selective hydrogenation catalysts, such as low catalytic activity in highly sulfurous streams, as taught by Cosyns et al. (column 1, line 39 to column 2, line 16).

Regarding claim 24, Cosyns et al. further teach the first catalyst zone is at most 75 vol.% of the total volume of the first and second catalyst zones (i.e., 1/3 of the total catalyst volume; column 4, EXAMPLE 3).

6. Claims 16, 20, 21 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Louie et al. (US 4,990,242) in view of Peyton (Ondeo/Nalco Fuel Field Manual) and Watkins (US 3,161,586).

Regarding claims 16, 20 and 21, Louie et al. (FIG. 1) discloses an apparatus comprising: a fractionation column **2** having a gas inlet line **1**, a first discharge line **3**, and a second discharge line **4** (column 4, lines 3-21);

a hydrotreatment zone **9** comprising a catalytic bed, a gasoline cut inlet line for introducing the first gasoline cut, said gasoline cut inlet line being in fluid communication with said first discharge line **3** of said fractionation column **2**, said hydrotreatment zone also comprising a hydrotreated effluent outlet line **11** (column 4, lines 22-54);

a stripping zone **17** comprising a hydrotreated gas inlet in fluid communication with said hydrotreated effluent outlet line **11** of said hydrotreatment zone **9**, an H_2S outlet line (H_2S SCRUBBING line), and a stripped gasoline outlet line **19** (column 6, lines 23-45); and

a hydrotreating zone **10** having a gasoline cut inlet line in fluid communication with the second discharge line **4**, a first hydrotreated cut outlet line **12**, and a hydrogen supply line **6** connected to the second discharge line **4** or the hydrotreating zone **10**, and a stripping column **18** having a hydrotreated cut inlet line in fluid communication with the first hydrotreated cut outlet line **12**, an H2S outlet line (H_2S SCRUBBING line), and a second hydrotreated cut outlet line (communicating with line **19**).

Louie et al. further disclose that subsequent to the stripping zone, "… in many cases, the liquid products are given a light caustic wash to assure complete removal of H_2S," (column 6, lines 37-61), thereby comprising a further refinement zone for improving the quality of the fuel.

However, Louie et al. is silent as to the refinement zone comprising a sweetening zone, having a gas inlet in fluid communication with the stripped gas outlet line **19** and an oxidizing agent supply line, and connected to a stripped and sweetened gasoline outlet line. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select a sweetening zone for the further refinement zone in the apparatus of Louie et al., on the basis of suitability for the intended use, because the use of sweetening processes for improving

the quality of refined fuel streams is conventionally known to those skilled the art, as evidenced by Peyton. For example, Peyton teaches the conventionality of sweetening a refined fuel stream according to the "Fixed-Bed Copper Chloride Sweetening Process" or the "Merox Process", wherein both processes involve an initial caustic wash of the fuel stream followed by the sparging of an oxidizing agent such as air or oxygen into the fuel stream, in the presence of a catalyst (page 27, section 2).

Louie et al. is silent as to the apparatus comprising a selective diene hydrogenation zone located between the fractionation column **2** and the hydrotreatment zone **9**, said selective diene hydrogenation zone comprising a gasoline inlet line in fluid communication with the first discharge line **3** and a dedienized first gasoline cut outlet line in fluid communication with the gasoline cut inlet line to hydrotreatment zone **9**.

Watkins teaches a desulfurization apparatus comprising a selective diene hydrogenation zone **11** located between a fractionation column **2** and a hydrotreatment zone **20** (see Figure and comments above). Watkins further teaches,

> "… in addition to the aforementioned contamination influences [see column 1, line 52 to column 2, line 5], the hydrocarbon distillates resulting from the various conversion processes hereinbefore set forth [see column 1, lines 26-51], contain appreciable quantities of unsaturated hydrocarbons, both mono-olefinic and diolefinic… When these unsaturated hydrocarbon distillates are subjected to a hydro-refining process for the purpose of removing sulfur, nitrogen and oxygen, and to effect the saturation of such olefinic hydrocarbons, *there frequently is encountered the difficulty of promoting the desired degree of reaction due to the formation of coke and other heavy carbonaceous material*… In addition, *polymerization and copolymerization of the mono-olefins and diolefins* are effected within the reaction zone, and to the extent that *the catalyst disposed therein becomes shielded by gummy polymerization products*, thereby becoming inaccessible to the hydrocarbon distillate being processed." (column 2, lines 6-33; with emphasis and comments added).

To minimize these disadvantages, Watkins teaches that,

> "... this difficulty may be overcome by effecting a hydrorefining process in individual stages; the distillate is first treated, in the presence of hydrogen, at a temperature less than about 500 °F, for the purpose of effecting *at least a partial saturation of the diolefins and mono-olefins* [i.e., selective diene hydrogenation], and subsequently is treated at a temperature in excess of 500 °F [i.e., hydrotreatment], for the purpose of removing various contaminants and to complete the saturation of the olefinic compounds." (column 3, lines 5-13; with emphasis and comments added).

Thus, it would have been obvious for one of ordinary skill in the art at the time the invention was made to provide a selective hydrogenation zone between the fractionation column **2** and hydro-treatment zone **9** in the apparatus of Louie et al., on the basis of suitability for the intended use, because the selective hydrogenation of the sulfur-containing gasoline fraction prior to conducting hydrotreatment saturates any dienes present in the gasoline stream prior to sulfur removal, thereby minimizing the undesirable formation of coke, heavy carbonaceous materials, and/or polymerization products within the hydrotreatment zone, as taught by Watkins above.

Regarding claim 30, Louie et al. discloses the gasoline cut inlet line to hydrotreatment zone **9** is adapted to receive the entire amount of the first gasoline cut carried by line **3**, exiting the upper portion of the fractionation column **2** (see FIG. 1).

7. Claims 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Louie et al. (US 4,990,242) in view of Peyton (Ondeo/Nalco Fuel Field Manual) and Watkins (US 3,161,586), as applied to claims 16, 20 and 21 above, and further in view of Cosyns et al. (U.S. 4,208,271). The collective teachings of Louie et al., Peyton and Watkins are silent as to the specifically recited catalyst compositions or dual zone configuration. The same comments with respect to Cosyns et al. apply (see above).

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Boitiaux et al. evidences the conventionality of a selective diene hydrogenation catalyst comprising the elements of Au and Pd, wherein the ratio of Au to Pd includes the recited ratio of 0.1:1, Au to Pd (relevant to claim 22).

* * *

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is (571) 272-1449. The examiner can normally be reached on 8:30 am - 5:30 pm M-F, every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jennifer A. Leung
February 24, 2004 JAL

Hien Tran

HIEN TRAN
PRIMARY EXAMINER